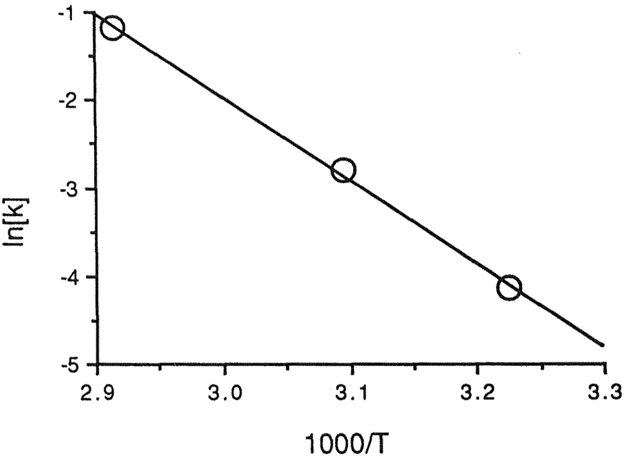

Fig. 11 Arrhenius plot of data in Fig. 4.10.

$$50°\text{C:} \quad \ln\left[\frac{x^{0.3}}{1-x}\right] = -0.881 + 0.0613t \tag{4.55}$$

$$70°\text{C:} \quad \ln\left[\frac{x^{0.3}}{1-x}\right] = -0.654 + 0.307t \tag{4.56}$$

When the slopes (the rate constants, in units of day^{-1}) are plotted versus absolute inverse temperature, a good Arrhenius fit is obtained as shown in Fig. 11. It is observed that the activation energy is about 18 kCal/mole, which is a reasonable figure.

2.1. Stability Prediction by Fractional Lives

It has been shown in Chapter 2 that for zero- and first-order reactions it is possible to assess and extrapolate stability from high-temperature data by use of fractional lives.

Tan et al. (1993) have extended this principle to oxidations, and Yoshioka et al. (1994) have extended it to complex reactions following neither of the more describable orders. They consider reactions where the fraction decomposed is a second-degree polynomial in time, t, and (more frequently) a triple exponential formation, i.e.,

$$x = A\exp(at) + B\exp(bt) + C\exp(ct) \tag{4.57}$$

or

$$x = a + bt + ct^2 \tag{4.58}$$

When treating decomposition of proteins by either of these equations, they obtain best parameters and hence can calculate the point in time where $x = 0.1$